ORDER NO. SD7806-1389

Service Manual

SL-3200/SL-3210

Direct Drive Automatic Turntable System

SL-3200 (X), (XAL) (XGE), (E) (XG), (XGF) /SL-3210 (E), (XG)

- The model SL-3200 (X) is available in Asia, Latin America, Middle East and Africa only.
- The model SL-3200 (XAL) is available in Australia only.
- The model SL-3200 (XGE) is available in United Kingdom only.
- The model SL-3200 (E) is available in Scandinavia only.
- The model SL-3200 (XG) is available in European only.
- The model SL-3200 (XGF) is available in France only.
- The model SL-3210 (E) is available in Scandinavia only.
- The model SL-3210 (XG) is available in European only.

- SL-3200 is of silver finish.
- SL-3210 is of black finish.

Specifications (Specifications are subject to change without notice for further improvement.)

General

Power supply:	~110-120/220-240V, 50/60Hz
Power consumption:	4.5W
Dimensions:	43.0 x 13.0 x 37.5 cm
(W x H x D)	(16-59/64x5-7/64x14-49/46 inches)
Weight:	6.9 kg (15.2 lb.)

Turntable section

Type:	Direct Drive Automatic Turntable System (Auto-return, Auto-stop)
Drive method:	Direct Drive
Motor:	Brushless DC motor
Turntable platter:	Aluminum die-cast, 30.4 cm (12")
Turntable speeds:	33-1/3 and 45 rpm
Pitch controls:	Individual adjustment controls, 10% adjustment range
Wow and flutter:	0.03% WRMS (JIS C5521) ±0.042/peak (IEC 98A Weighted)
Rumble:	−73 dB (IEC 98A Weighted)

Tonearm section

Type:	Universal tubular arm, staticbalanced type
Effective length:	230 mm (9-1/16")
Overhang:	15 mm (19/32")
Friction:	Within 7 mg (horizontally and vertically)
Effective mass:	12 g (without cartridge)
Tracking error angle:	Within 2°32' (at the outer groove of 30 cm (12") record) Within 0°32' (at the inner groove of 30 cm (12") record)
Offset angle:	22°
Adjustable stylus pressure range:	0 to 2.5 g (stylus pressure direct reading type)
Cartridge weight range:	6 to 9.5 g (13.5 ~ 17 including headshell)
Headshell weight:	7.5 g

Cartridge section (for set with cartridge)

Model No.:	EPC-270C
Type:	Moving magnet
Frequency response:	20 Hz to 25 kHz −3 dB 20 Hz to 15 kHz ±2 dB
Output voltage:	3.2 mV at 1 kHz 5 cm/sec. zero to peak lateral velocity (6.4 mV at 1 kHz, 10 cm/sec. zero to peak lateral velocity [DIN 45500])
Channel separation:	25 dB at 1 kHz
Channel balance:	Within 2 dB at 1 kHz
Compliance (dynamic):	10 X 10^{-6} cm/dyne at 100 Hz (CBS STR-100)
Stylus pressure:	1.75±0.25 g (17.5±2.5mN)
Load impedance:	47 kΩ to 100 kΩ
Weight:	6.0 g (cartridge only)
Replacement stylus:	EPS-270SD

Specifications subject to change without notice.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

TECHNISCHE DATEN

Allgemeine Daten

Netzspannung:	~110-120/220-240 V, 50/60 Hz Wechselstrom
Leistungsaufnahme:	4,5 W
Abmessungen: (B x H x T)	43,0 x 13,0 x 37,5 cm
Gewicht:	6,9 kg

Plattenspielerteil

Typ:	Automatisches Plattenspielersystem mit Direktantrieb, (Rückführautomatik, stopautomatik)
Antrieb:	Direktantrieb
Motor:	Kollektorloser Gleichstrommotor
Plattenteller:	Aluminium-Spritzguß 30,4 cm ϕ
Plattenteller-Drehzahlen:	33-1/3 und 45 U/min
Geschwindigkeits-Feineinstellung:	Für jede Geschwindigkeit gesondert, mittels Einsteller, 10% Einstellbereich
Gleichlaufschwankungen:	0,03% WRMS (JIS C5521) ±0,043% bewertet Null-zu-Spitze (IEC 98A bewertet)
Rumpel-Geräuschspannungsabstand:	–53 dB (IEC 98A unbewertet) –75 dB (IEC 98A bewertet)

Tonarmteil

Typ:	Universal-Rohrtonarm statisch ausbalanciert
Effektive Länge:	230 mm
Überhang:	15 mm
Mechanischer Widerstand:	Weniger als 7 mg (horizontal, vertikal)
Spurfehlwinkel:	Innerhalb 2°32′ (bei der äußeren Rille einer 30 cm-Schallplatte) Innerhalb 0°32′ (bei der inneren Rille einer 30 cm-Schallplatte)
Kröpfungswinkel:	22°
Effektive Masse:	12 g (ohne Tonabnehmer)
Auflagedruck-Einstellbereich:	0–2,5 g (direkt ablesbare Einstellung)
Zulässiger Tonabnehmer Gewichtbereich:	6–9,5 g 13,5–17 g (einschließlich Tonarmkopf)
(mit Tonarmkopf-Gewicht):	3–9,5 g 10,5–17 g (einschließlich Tonarmkopf)
Tonarmkopf-Gewicht:	7,5 g

Tonabnehmerteil

Modell-Nummer:	EPC-270C
Typ:	Magnetischer Tonabnehmer
Frequenzgang:	20 Hz to 25 kHz –3 dB 20 Hz to 15 kHz ±2 dB
Ausgangsspannung:	3,2 mV bei 1 kHz 5 cm/sec Null-zu Spitze, lateral (6,4 mV bei 1 kHz 10 cm/sec Null-zu Spitze, lateral, [DIN 45500])
Kanaltrennung:	25 dB bei 1 kHz
Kanalabweichung:	Innerhalb 2 dB bei 1 kHz
Nachgiebigkeit (dynamisch):	10×10^{-6} cm/dyn bei 100 Hz (CBS STR-100)
Auflagekraft:	1,75 ±0,25 g 17,5 ±2,5 mN)
Impedanz:	47 kΩ bis 100 kΩ
Gewicht:	6,0 g (ohne Tonarmkopf)
Ersatznadel:	EPS-270SD

Änderungen der technischen Daten vorbehalten.

CARACTERISTIQUES TECHNIQUES

Généralités

Alimentation:	Alternatif 110-120/220-240 V, 50 ou 60 Hz
Consommation:	4.5 W
Dimensions: (L x H x P)	43,0 X 13, 0 X 37,5 cm
Poids:	6,9 kg

Platine de lecture

Type:	Système de platine automatique à entraînement direct (retour automatique, arrêt automatique)
Système d'entrainement:	Entraînement par courroie
Moteur:	Moteur C.C. sans balais
Plateau de lecture:	Aluminium moulé sous pression Diamètre 30,4 cm
Vitesses de rotation:	33-1/3 et 45 t/p.m.
Commandes de précision de la vitesse:	Commandes de réglage individuelles; plage de réglage 10%
Pleurage et scintillement:	0,03% de valeur efficace (JIS C5521) ±0,042% de crête (IEC 98A Pondéré)
Ronflement	–53 dB (IEC 98A Non-pondéré) –75 dB (IEC 98A Pondéré)

Bras de lecture

Type:	Bras tubulaire universel, de type à équilibrage statique
Longueur effective:	230 mm
Porte-à-faux:	15 mm
Frottement:	Moins de 7 mg (horizontal et vertical)
Masse réelle:	12 g (sans la cellule pick-up)
Angle d'erreur de piste:	En deçà de 2°32′ (au sillon extérieur d'un disque de 30 cm) En deçà de 0°32′ (au sillon intérieur d'un disque de 30 cm)
Angle de décalage:	22°
Plage de réglage de la pression d'appui:	0 à 2,5 g (type à lecture directe de la pression d'appui de la pointe)
Gamme de poids de la cellule pick-up utilisable:	6 à 9,5 g 13,5 à 17 g (y compris la coque porte-cellule)
(avec contrepoids de la cellule):	3 à 6,5 g 10,5 à 14 g (y compris la coque porte-cellule)
Poids de la coquille porte-cellule:	7,5 g

Cellule pick-up (pour appareil avec cellule pick-up).

No. du modèle:	EPC-270C
Type:	Aimant mobile
Réponse en fréquence:	20 Hz à 25 kHz –3 dB 20 Hz à 15 kHz ±2 dB
Tension de sortie:	3,2 mV à 1 kHz 5 cm/sec., zéro à vitesse latérale de crête (6,4 mV à 1 kHz, 10 cm/sec., zéro à vitesse latérale de crête [DIN 45500])
Séparation de canal:	25 dB à 1 kHz
Equilibrage des canaux:	En deçà de 2 dB à 1 kHz
Elasticité (dynamique):	10×10^{-6} cm/dyne à 100 Hz (CBS STR-100)
Pression de la pointe de lecture:	1,75 ±0,25 gramme (17,5 ±2,5 mN)
Impédance de charge:	47 kΩ à 100 kΩ
Poids:	6,0 grammes (cellule seule)
Pointe de lecture de remplacement:	EPS-270SD

Les spécifications sont susceptibles d'être modifiées sans préavis.

■ PARTS IDENTIFICATION

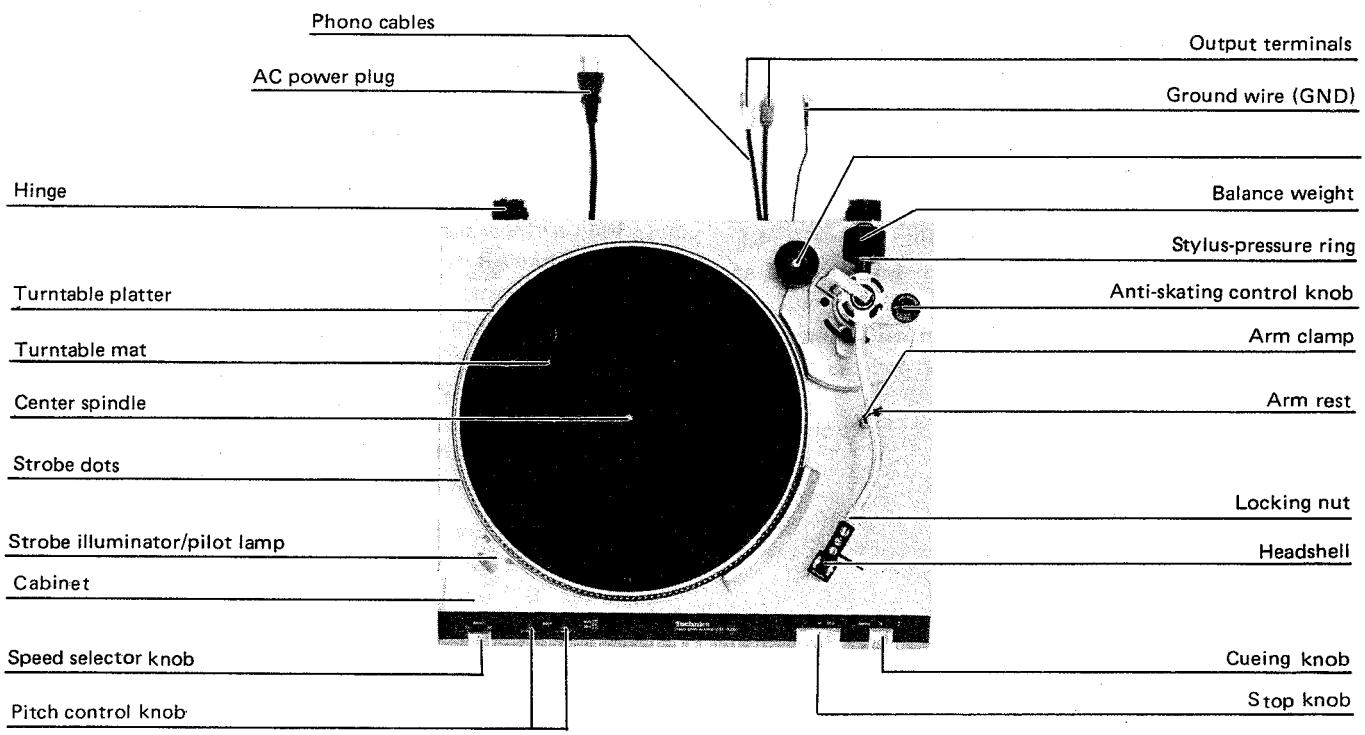


Fig. 1

■ FEATURES

Ultra-Low-Speed Direct Drive Motor

The direct-drive of the SL-3200 eliminates the belts, wheels, and other drive elements required by conventional systems. These same belts and so on are notorious sources of vibration, resonance, and cyclical variations in speed. With only one moving part, the D.D. system does away with these sources of disturbance, to provide superbly smooth, constant platter rotation.

Integral Rotor-Platter Structure

To further simplify the turntable design, the platter and rotor are formed into a single, continuous unit. By eliminating a linkage point, this prevents the potentially disturbing effects of looseness or maladjustment between platter and rotor.

All Front-Panel Controls

The advancement to complete front-panel control marks a big step forward in turntable operation, not only because of the greater convenience, but also because of the greater protection from dust, as the dust cover can stay closed.

Tonearm Cueing Controlled from Front Panel

The tonearm is raised and lowered softly by a viscous-damped cueing lifter. Even with the dust cover closed, a cueing can be easily performed as the control is located on the front panel.

High Sensitive Gimbal Suspension

The recently developed high sensitivity tonearm bearings featured in this unit achieve a very high degree of performance. In addition, the universal-type detachable headshell features all gold-plated pin connections to ensure unwavering reliability through many years of use.

Independent Pitch Controls

Permits record speed (at both 33-1/3 and 45 rpm) to be varied by up to 10%.

Precision Strobe Illuminator/Pilot Lamp

With the built-in strobe illuminator/pilot lamp, accurate speed adjustments can be made rapidly and easily.

Anti-Skating Force Mechanism

The well-designed anti-skating force mechanism ensures minimum side thrust with different cartridges and guarantees accurate center-of-the-groove tracking.

Automatic Tonearm Return

For greater operational convenience, the tonearm returns to the arm rest automatically.

Detachable Dust Cover

■ HOW TO OPERATE

1. **Place a record on the turntable mat.**
2. **Set the speed select knob to the desired record speed. (See Fig. 2.)**
3. **Remove the stylus protector.**
4. **Release the arm clamp.**
5. **Set the cueing knob to the "▼" position. (See Fig. 3.)**
6. **Move the tonearm over the desired groove.**
   When you move the tonearm towards the center spindle, the turntable platter will rotate.
7. **Set the cueing knob to the "▼" position. (See Fig. 4.)**
   The tonearm will descend slowly onto the record and play will begin.
8. **When play has finished, the tonearm will automatically return to the arm rest (auto-return) and the turntable platter will stop rotation.**
   (The turntable platter will continue to rotate briefly due to its own inertia.)

Note:

- After play is completed, fasten the tonearm with the arm clamp and set the speed select knob to the "•" position.
- Attach the stylus protector again, if you have one, to protect the stylus tip from damage.

When you play a 45-rpm record with a large center hole

Place the 45-rpm adaptor on the center spindle. Set the speed select knob to the "45" position.

How to suspend play

Set the cueing knob to the "▼" position.
The stylus tip of the cartridge will be lifted from the record.

How to stop play

Set the stop knob to the "stop" position. **(See Fig. 5.)**
The tonearm will automatically return to the arm rest and the turntable will stop rotating.

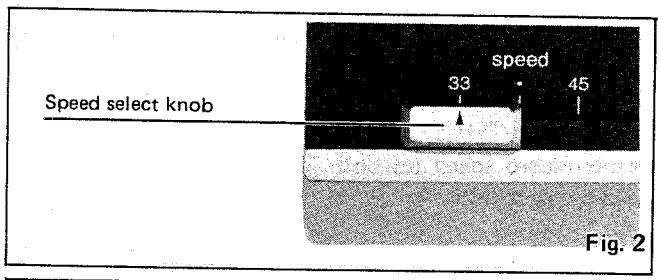


Fig. 2

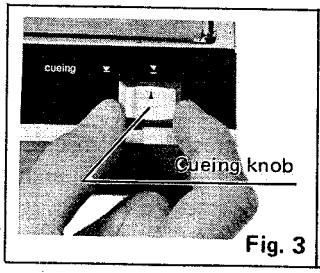


Fig. 3

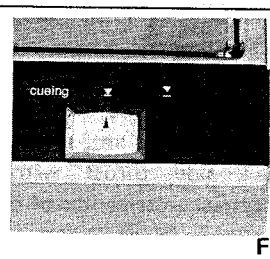


Fig. 4

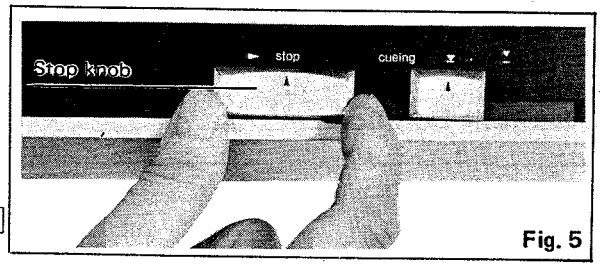


Fig. 5

■ ADJUSTMENTS

Adjustments of horizontal zero "0" balance and stylus pressure

1. Remove the stylus protector. Be careful not to touch your fingers to the stylus tip.
2. Release the arm clamp and lift the tonearm from the arm rest to free it.

Note:

- When you move the tonearm toward the center spindle, the turntable platter will move slightly, even if the speed select knob is at the "•" position, but this movement is not significant.
- If the tonearm pulls toward the arm rest when the tonearm is held in a free state as shown in the picture **(See Fig. 6)**, rotate the turntable platter clockwise about 10 times. This will disengage the automatic mechanism from the tonearm gear, which in rare cases may have moved out of its normal position during transportation.

3. Turn the entire balance weight clockwise (indicated by the arrow "**A**") or counterclockwise (indecated by the arrow "**B**") until the tonearm is approximately balanced horizontally (floats freely). **(See Figs. 6 and 7.)**

Note:

- During the adjustment of the horizontal "0" balance, be careful that the stylus tip of the cartridge does not contact the turntable mat or turntable base.

4. After the tonearm is horizontally "0" balanced, temporarily fasten the tonearm with the arm clamp.
5. Hold the balance weight stationary with one hand, as shown in the picture, and rotate only the stylus-pressure ring to bring the numeral "0" of the ring into alignment with the center line of the tonearm rear shaft. The adjustment of the horizontal "0" balance is now completed. **(See Fig. 8.)**

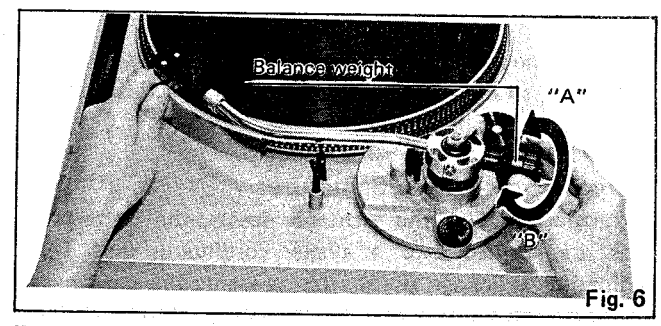


Fig. 6

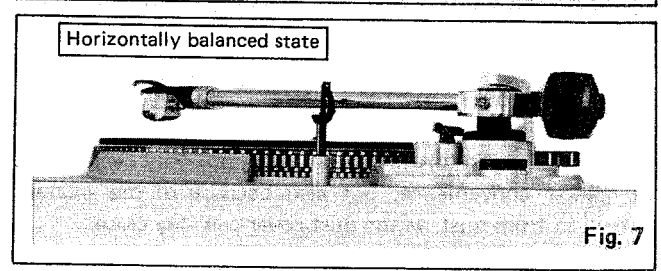


Fig. 7

6. After adjusting the horizontal "0" balance, turn the balance weight clockwise in the direction of the arrow and align to the correct stylus pressure. (The stylus pressure of this unite is 1.75g.) **(See Fig. 9.)**

Note:

- As the stylus-pressure ring moves in step with the

balance weight, proper stylus pressure can be selected by directly reading the graduated ring.

- Set the stylus pressure to the maximum recommended value for your cartridge in cases where the record has an extremely high recording level, or where the unit is operated in a room at low temperature or in places in which the unit is subjected to vibrations.

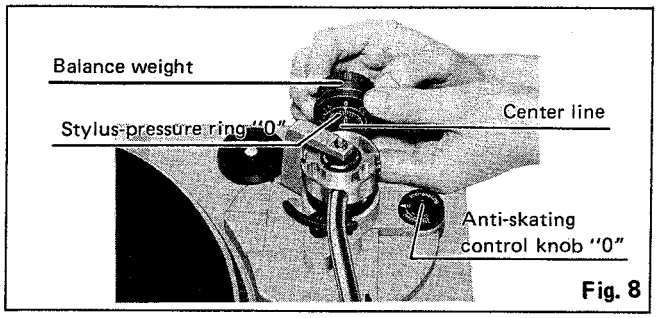


Fig. 8

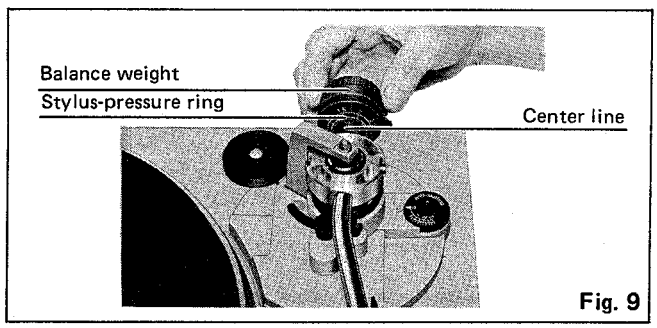


Fig. 9

Adjustment of the anti-skating control

Set the anti-skating control knob to the same value as the stylus pressure. **(See Fig. 10.)**

Note:

- When a cartridge with integral dust brush is used, follow the cartridge manufacturer's recommendation for adjusting both stylus pressure and anti-skating force.

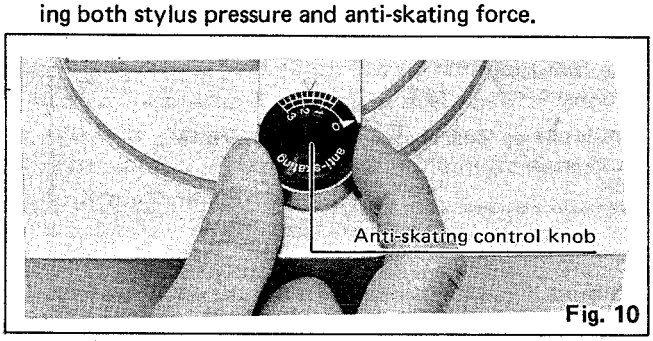


Fig. 10

Adjustment of arm-lift height (See Fig. 11.)

- The arm-lift height distance between the stylus tip and record surface when cueing knob is at "▼" has been adjusted at the factory before shipping to approximately 5 to 10 mm.
- For using different cartridges available on the market or when further adjustments are particularly necessary, make adjustment as follows:

1. Put on the stylus protector to protect the stylus tip from damage.
2. Set the speed select knob to the "•" position to prevent the turntable platter from rotation.
3. Move the tonearm towards the center spindle.
4. Turn the adjustment screw clockwise or counterclockwise, while pushing the arm lift down. **(See Fig. 11.)**

Clockwise rotation
– distance between the record and stylus tip is reduced.

Counterclockwise rotation
– distance between the record and stylus tip is increased.

Note:

- As the adjusting screw has a hexagonal head, be sure to make the adjustment while depressing the arm lift, or the screw will not move freely. Also be sure that the hexagonal head retracts correctly into the arm lift when the latter is released.

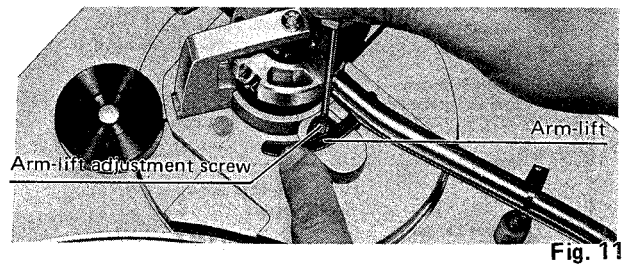


Fig. 11

Speed adjustment (with pitch control knobs)

Strobe dots are set on the rim of the turntable platter according to the power-line frequency and the speed of the records. Make adjustment, referring to strobe-dot indication.

1. Place a record on the turntable mat.
2. Set the speed select knob to the speed to be adjusted.
3. Adjust the speed while playing a record.
   The strobe-illuminator/pilot lamp will be lit for illuminating the strobe dots.
4. While turning the pitch control knobs either to "+" side or "–" side, adjust so that the strobe dots of the turntable platter look as if they were stationary. The state under which the strobe dots seem to be stationary represents the correct number of revolutions.

"+" direction

This increases the speed of the turntable rotation, and the strobe dot pattern seems to flow in the same direction as the rotational direction of the turntable platter.

"–" direction

This decreases the speed of the turntable rotation, resulting in a state opposite to that in the "+" direction.

Note:

Strobe dot pattern

The strobe-illuminator/pilot lamp of this unit employs the commercially available power source. The frequency of such power source, when actually measured, has a fluctuation of about 0.2%. As such a fluctuation of the power source affects the strobe illuminator, the strobe dot pattern also seems to fluctuate to a certain extent.

But the unit is not affected by these fluctuations of the power source, since a DC motor is employed. In other words, rotation of the platter will be constant, and slight shifts in the movement of the dots simply reflect normal drift in the power-source frequency.

Adjustment for automatic return position (See Fig. 12.)

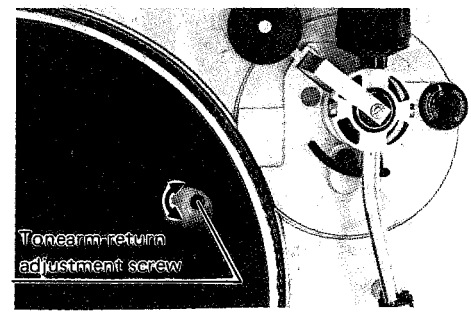
(Remove the turntable mat.)

In cases where the tonearm tends to return before playing has finished.

— **Rotate clockwise.**

In cases where the tonearm fails to return after the last groove of the record.

— **Rotate counterclockwise.**



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■ OPERATION PRINCIPLES OF THE SL-3200/3210

This unit, like the SL-1300 has a rational motor structure, and its drive control circuit is the B.F.G. type (Back TECHNICAL EXPLANATION electromotive force frequency generator) which is constructed on a single integrated Circuit (IC) chip(AN630). The following is a block diagram of the IC (AN630) for which the operating principle will be briefly explained.

■ OPERATING PRINCIPLE

The back electromotive force, which is generated by the drive coil winding according to the rotation of the motor, is detected and converted to a frequency signal that is proportional to the number of revolutions.
Conversion is performed by a wave-shaping circuit and a logic circuit (This is referred to as the B.F.G. method).
This frequency signal is compared with a standard signal by means of a frequency-voltage conversion circuit which converts it to a voltage singal in order maintain a constant number of revolutions.

After removing unnecessary frequency compo with the operational-amplifier active filter, fro voltage signal, it controls the current flow in differential switching circuits. As a result, the fl current in the drive coil winding is always co maintaining the correct rotational speed. Cont the rotational speed can be performed by me adjusting the standard signal generator circuit a ing to the rotational speed adjustment circuit.

■ EXPLANATION OF EACH PART

1. B.F.G. METHOD (BACK ELECTROMOTIVE FORCE FREQUENCY GENERATOR)

Making use of the back electromotive force that is generated in the drive coil winding of the motor as a frequency generator, the frequency of the frequency generator is converted to the number of revolutions for the turntable.
After shaping the wave form of this back electromotive force, it is composed logically, and a frequency is generated that is proportional to the number of revolutions. This is the use of the B.F.G. Making use of the drive coil winding, frequency generator coil windings and magnets are not necessary, yielding a motor structure that is very compact.

2. FREQUENCY-VOLTAGE CONVERSION CIRCUIT

Being composed of a trapezoldal wave generating circuit, a pulse generating circuit and a sampling integration circuit, the B.F.G. output frequency is converted to a voltage, and control output voltage is generated in order to maintain the rotational speed of the turntable at a constant level.

3. OPERATION CONTROL CIRCUIT

The operation control circuit functions as a c output voltage control keeping the rotational sp the turntable constant with regard to the start of table operation and the operation of the mecha With this circuit, transient response characteristic starting characteristics are very good.

4. OPERATIONAL AMPLIFIER (OP AMP) AC FILTER

Because of using an operational amplifier in the filter, an ideal filter operation is possible.
As a result, such high performance as a signal-to (SN) ratio of 60 dB (IEC-B) and a wow-and-flutte of 0.03% (WRMS) have been achieved.

5. DRIVE CIRCUIT

By incorporating a large capacity power transistor integrated circuit, a starting torque of 1 kg-cm c obtained. By means of this large starting torque, p starts have been realized.

6. THREE DIFFERENTIAL SWITCHING CIRC

By means of the signal from the position signal co starting circuit power transistor selector op obtaining smooth rotation.

■ JUSTIERUNGEN

Justierung des Antiskating-Einstellers

Stellen Sie den Antiskating-Einstellknopf auf den gleichen Wert ein, wie den Auflagedruck. **(Vgl. Abb. 10)**

Anmerkung:

- Wenn Sie einen Tonabnehmer mit einem daran befestigten Pinselchen benutzen, halten Sie sich bei der Einstellung der Auflagekraft und des Antiskatingwertes an die Empfehlungen des Tonabnehmer-Herstellers.

Einstellung des Tonarmlifts (Vgl. Abb. 11)

- Die Tonarmlifthöhe, d.h. der Abstand zwischen der Schall-plattenoberfläche und der Nadelspitze, wenn der Lift-Schieber in der "▼"-Position ist, wurde vor der Auslieferung auf ungefähr 5—10 mm eingestellt.
- Für die Benutzung anderer Tonabnehmer, die auf dem Markt erhältlich sind, oder, falls eine weitere Justierung unbedingt erfoderlich ist, nehmen Sie die Justierung auf folgende Weise vor:

1. Stellen Sie den Geschwindigkeits-Wahlschalter in die "•"-Position, damit sich der Plattenteller nicht dreht.
2. Führen Sie den Tonarm gegen die Plattentellerachse.
3. Drehen Sie die Justierschraube im Uhrzeigersinn oder Gegenuhrzeigersinn, währenddem Sie die Tonarmlift-führung nach unten drücken. **(Vgl. Abb. 11)**

Im Uhrzeigersinn

—Der Abstand wird kleiner.

Im Gegenuhrzeigersinn

—Der Abstand wird größer

Anmerkung:

- Da die Justierschraube einen Sechskantkopf hat, muß die Tonarmliftführung während dem Justieren unbedingt gedrückt gehalten werden.
  Vergewissern Sie sich, daß der Sechskantkopf in die Tonarmliftführung zurückkehrt, wenn diese losgelassen wird.

Einstellen des Abschaltpunktes der Automatik (Vgl. Abb. 12)

(Die Plattentellerauflage abnehmen.)

Falls der Tonarm zu früh zurückkehrt.

—Im Uhrzeigersinn drehen.

Falls der Tonarm nach erreichen der Auslaufrille nicht zurückkehrt.

—Im GegenuhrzelgersInn drehen.

Geschwindigkeits-Feineinstellung (mittels der Feineinsteller)

Die Stroboskoppunkte sind auf dem Plattentellerrand entsprechend der Stromfrequenz und der Drehzahl der Schallplatten angebracht. Richten Sie sich bei der Drehzahl-Feineinstellung nach dem Stroboskopbild.

1. Legen Sie eine Schallplatte auf den Plattenteller.
2. Stellen Sie den Geschwindigkeits-Wahlschieber auf die zu regulierende Geschwindigkeit ein.
3. Regulieren Sie die Geschwindigkeit während dem Abspielen der Platte.
   Die Stroboskoplampe/Einschaltkontrollampe leuchtet zur Beleuchtung der Stroboskoppunkte.
4. Regulieren Sie durch Drehen der Einstellknöpfe in "+" oder "—" Richtung, solange, bis die Stroboskoppunkte den Anschein vermitteln, daß sie stillstehen. Der Zustand, in dem die Stroboskoppunkte scheinbar stationär verbleiben, stellt die korrekte Drehgeschwindigkeit dar.

"+" Richtung

Die drehgeschwindigkeit des Plattentellers erhöht sich und die Stroboskoppunkte scheinen in der gleichen Richtung zu laufen, wie der Plattenteller.

"-" Richtung

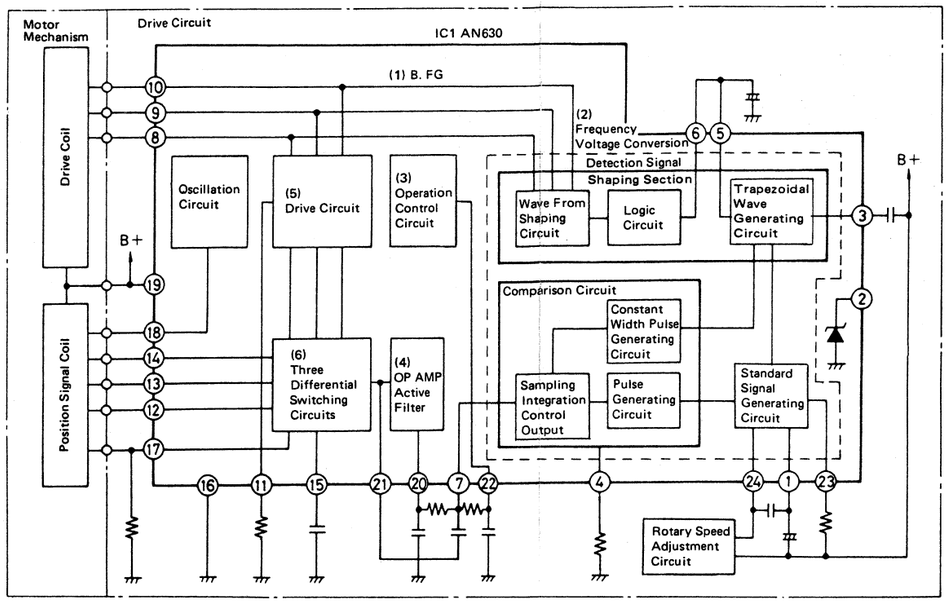
Die Drehgeschwindigkeit des Plattentellers verringert sich, und die Stroboskoppunkte laufen in der, der Drehrichtung des Plattentellers entgegengesetzten Richtung.

Anmerkung:

Stroboskoppunktemuster

- Die Stroboskoplampe/ Kontrollampe dieses Gerätes arbeitet mit normalem Netzstrom. Die Frequenz dieser Stromquelle besitzt einen Schwankungsbereich von 0,2%. Da eine solche Schwankung der Stromquelle die Stroboskoplampe beeinflußt, scheint das Punktemuster auch zu einem gewissen Grad zu fließen. Die Drehzahl des Plattentellers wird jedoch durch diese Schwankung nicht beeinflußt, da ein Gleichstrommotor den Plattenteller antreibt.
  Anders ausgegrückt, die Umdrehungsgeschwindigkeit des Plattentellers bleibt konstant, und die geringfügige Bewegung des Stroboskoppunktemusters entspricht lediglich der normalen Schwankung derNetzfrequenz.

■ BLOCK DIAGRAM



■ REPLACEMENT PARTS LIST

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. **S** indicates that only parts specified by the manufacturer be used for safety.

3. SL-3200 (X) → [X] SL-3200 (XAL) → [XAL] SL-3200 [XG] → [XG] SL-3200 [XGF] → [XGF] SL-3200 (XGE) → [XGE] SL-3200 (E) → [E] SL-3210 [E] → [10E] SL-3210 [XG] → [10XG]

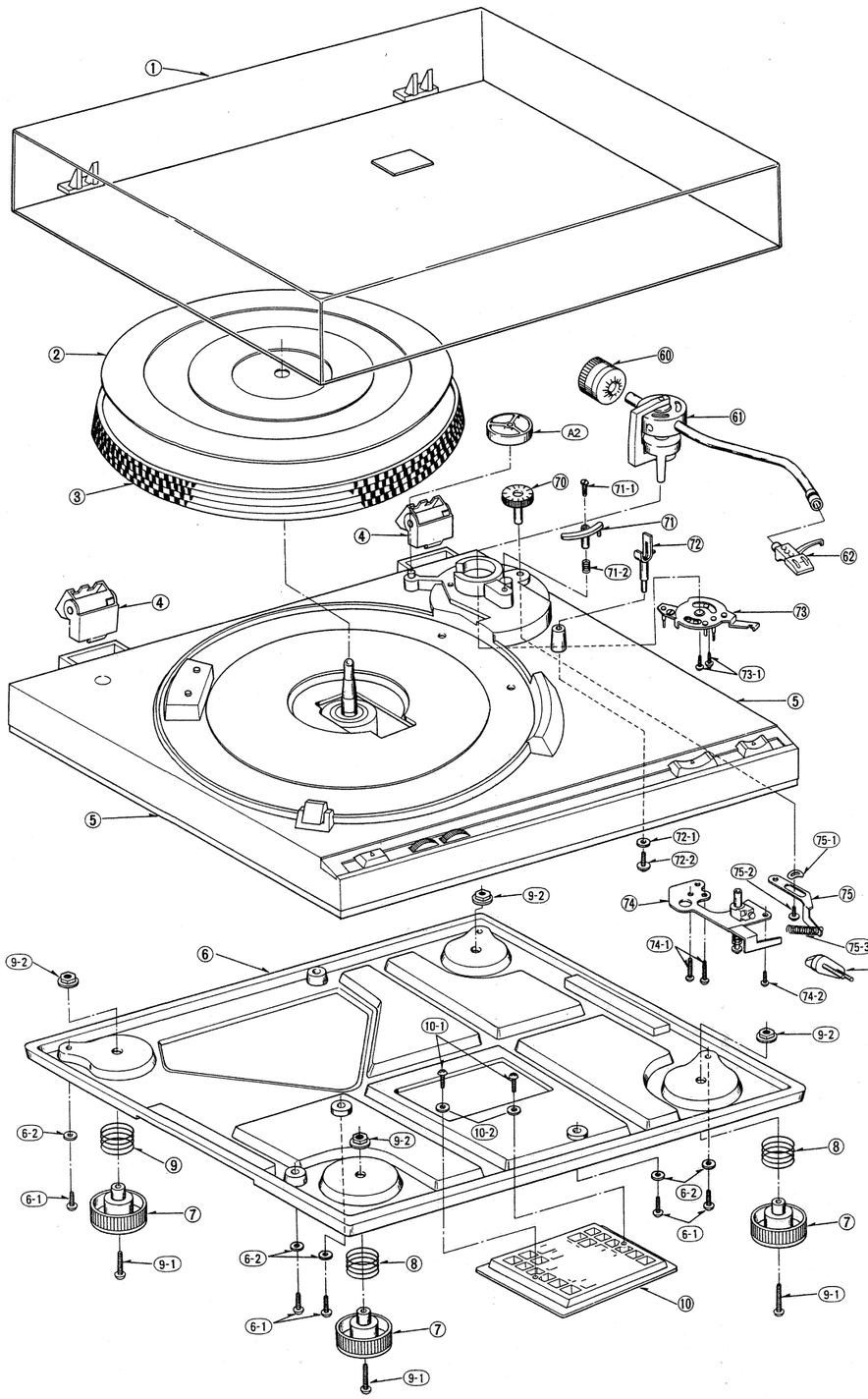
Ref. No.		Part No.	Part Name & Description
INTEGRATED CIRCUIT			
IC1		AN630U	Integrated Circuit
TRANSISTORS			
Q1		**2SC1846-Q**	Transistor
Q2		**2SC1328-T**	Transistor
DIODES			
D1	S	SVDS1RBA20	Rectifier
D2, 3, 4		OA90	Diodes
TRANSFORMER			
T1	S	SLTF5352A	Power Transformer
LAMP			
NL1	S	SFDNE2HU	Neon Lamp
SWITCHES			
S1	S	SFDSAH764039	Switch, Power
S2		EVAL06SBBAAF	Switch, Speed Selector
S3	S	SFDSHXW13312	Switch, Power Source Selector
FUSE			
F1		XBA2C04TRO	400mA, Fuse
F2		XBA2C012TRO	125mA, Fuse
VARIABLE RESISTORS			
VR1, 2		EVLS3AA00B54	50kΩ, Pitch Control
VR3, 4		EVHX8AF15B54	50kΩ, Speed Control

Ref. No.		Part No.	Part Name & Description
RESISTORS			
R1	S	ERD50TJ272	Carbon, 2.7kΩ, 1/2W, ± 5%
R2		ERD25TJ822	Carbon, 8.2kΩ, 1/4W, ± 5%
R3, 4		ERD25TJ472	Carbon, 4.7kΩ, 1/4W, ± 5%
R5		ERD25TJ330	Carbon, 33Ω, 1/4W, ± 5%
R6	S	ERX1ANJ3R9	Metallic, 3.9Ω, 1W, ± 5%
R7		ERO25CKF6202	Metallic, 62kΩ, 1/4W, ± 1%
R8		ERD25TJ393	Carbon, 39kΩ, 1/4W, ± 5%
R9		ERD25TJ104	Carbon, 100kΩ, 1/4W, ± 5%
R10		ERD25TJ563	Carbon, 56kΩ, 1/4W, ± 5%
R11		ERD25TJ102	Carbon, 1kΩ, 1/4W, ± 5%
R12		ERO25CKF3902	Metallic, 39kΩ, 1/4W, ± 1%
R13	S	ERX1ANJ3R9	Metallic, 3.9Ω, 1W, ± 5%
R102	S	ERG1ANJ103	Metallic, 10kΩ, 1W, ± 5%
CAPACITORS			
C1		ECEB1HS471	Electrolytic, 470μF, 50V
C2		ECEA1JS4R7	Electrolytic, 4.7μF, 63V
C3		ECEA50ZR22	Electrolytic, 0.22μF, 50V
C4		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C5		ECEA50ZR33	Electrolytic, 0.33μF, 50V
C6, 7, 8		ECEA50N1	Electrolytic, 1μF, 50V
C9		ECQF2334KZ	Polyester, 0.33μF, 200V, ±10%
C10		ECQM1H154KZ	Polyester, 0.15μF, 50V, ±10%
C11		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C12		ECEA25M10R	Electrolytic, 10μF, 25V
C13		ECEA50M2R2R	Electrolytic, 2.2μF, 50V
C14		ECSZ35EFR33E	Electrolytic, 0.33μF, 35V
C15		ECEA1VS330	Electrolytic, 33μF, 35V
C16		ECEM1H472KZ	Polyester, 0.0047μF, 50V, ±10%
C17		ECQM1H473KZ	Polyester, 0.047μF, 50V, ±10%
C18, 19, 20	S	ECEA2A 010	Electrolytic, 1μF, 100V,
C101 [X, XAL, XGE, XG, XGF, 10XG]	S	ECQE2A103MZ	Polyester, 0.01μF, 250V, ±20%
C101 [E, 10E]	S	ECKDHS103SE2	Polyester, 0.01μF, 400V, ±20%

■ SCHEMATIC DIAGRAM (This schematic diagram may be at any time with the development of new technology.)

| | | |

■ EXPLODED VIEWS



■ REPLACEMENT PARTS LIST

Notes:
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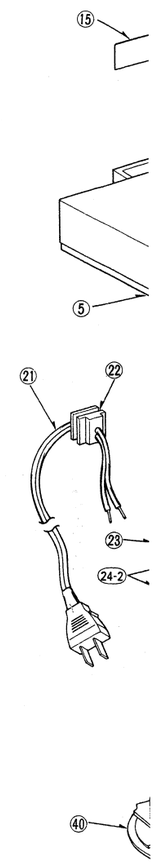
3. SL-3200 (X) → [X] SL-3200 (XG) → [XG] SL-3200 (XGE) → [XGE] SL3210 (E) → [10E]
   SL-3200 (XAL) → [XAL] SL-3200 (XGF) → [XGF] SL-3200 (E) → [E] SL-3210 (XG) → [10XG]

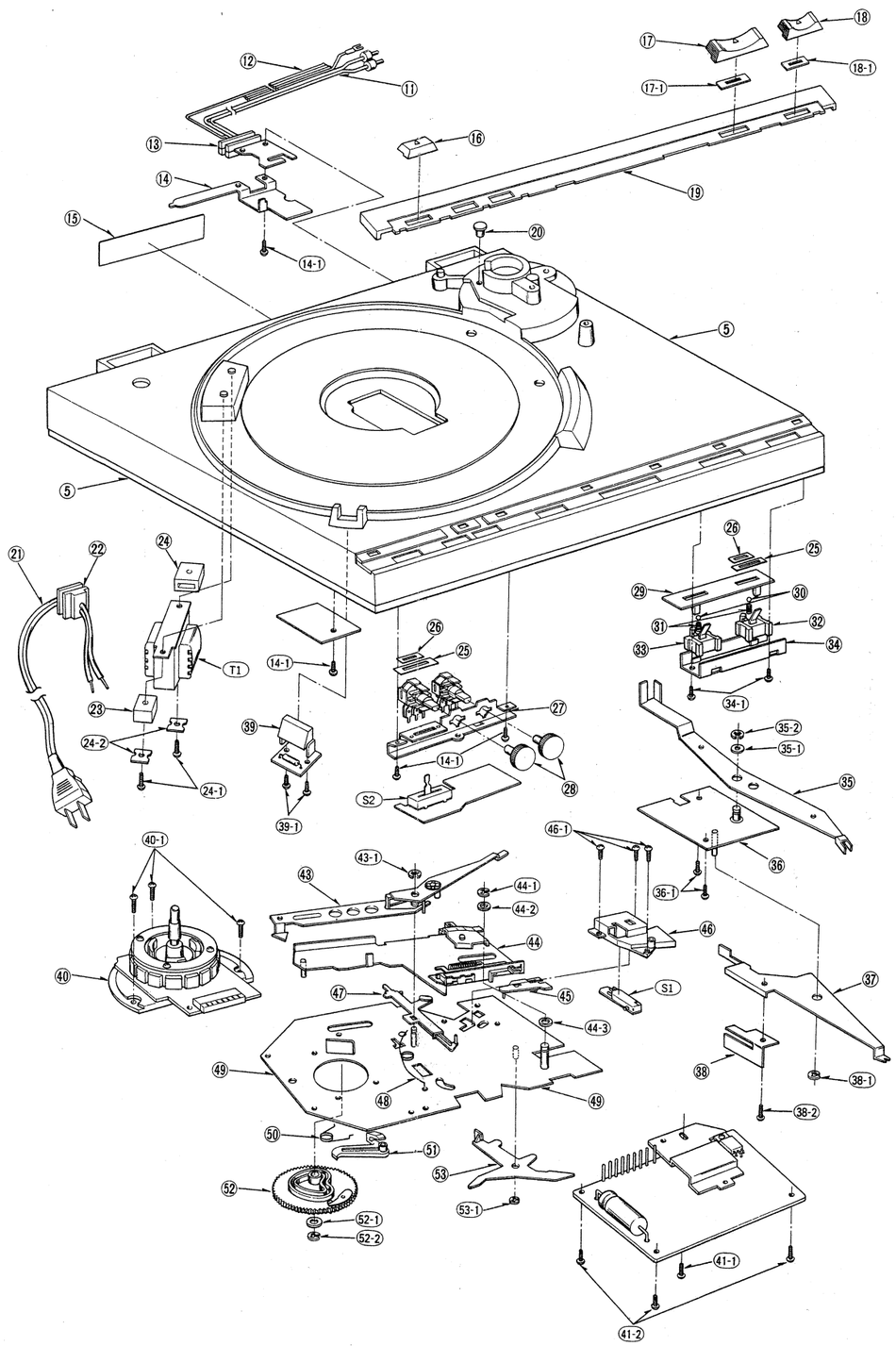
Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1		SFAD019-01E	Dust Cover
2		SFTG320-01	Turntable Mat
3		SFTE320-01A	Turntable
4		SFAT301-01A	Hinge Ass'y
5 [X, XAL, XGE, E, XG, XGF]		SFAC320-01	Cabinet
5 [10E, 10XG]		SFAC321P01	Cabinet
6		SFAU320-01	Bottom Board
6-1		XTN3+20B	Screw, Bottom Board
6-2		XWG3	Washer, Bottom Board
7		SFGA212-01	Audio Insulator
8		SFQC200-01	Spring, Audio Insulator
9		SFQC200-02	Spring, Audio Insulator
9-1		XSN3+14S	Screw, Audio Insulator
9-2		SFXN212-01	Nut, Audio Insulator
10		SFUM320-02	Cover, Bottom Board
10-1		XTN3+8B	Screw, Cover
10-2		XWG3	Washer, Cover
11		SFDH212-01	Phono Cord
12		SFEL028-01E	Ground Wire
13		SFUM212-08	Clamper, Phono Cord
14		SFUP320-01	Plate, Shield
14-1		XTV3+10C	Screw
15 [X, XG, XGF]		SFNN320X01	Name Plate
15 [10XG]		SFNN321X01	Name Plate
15 [E]		SFNN320S01	Name Plate
15 [XAL, XGE]		SFNN320G01	Name Plate
15 [10E]		SFNN321S01	Name Plate
16		SFKT320-03	Knob, Speed Select
17		SFKT320-01	Knob, Stop
17-1		SFXW212-02	Washer, Stop Knob
18		SFKT320-02	Knob, Cueing
18-1		SFXW212-01	Washer, Cueing Knob
19 [X. XAL, XGE, E, XG, XGF]		SFKK320-01	Panel
19 [10E, 10XG]		SFKK321P01	Panel
20 [X, XAL, XGE, E, XG, XGF]		SFGK170-01	Cap, Rubber
20 [10E, 10XG]		SFGK171F01	Cap, Rubber
21 [X, E, XG, XGF, 10E, 10XG]	**S**	RJA23ZC	AC Cord
21 [XAL]	**S**	QFC1207M	AC Cord
21 [XGE]	**S**	RJA45ZC	AC Cord
22 [except XAL]		SFUM190-12	Bushing, AC Cord
22 [XAL]		SFUM190-11	Bushing, AC Cord
23		SFGC320-02	Supporter, Power Transformer (A)
24		SFGC320X01	Supporter, Power Transformer (B)
24-1		XTV3+10C	Screw, Power Transformer
24-2		SFUP320-04	Supporter, Power Transformer (C)
25		SFUP212-13	Shutter (A)
26		SFUP212-07	Shutter (B)
27		SFUP212-11	Plate, Speed Adjustment
28		SFKT212-02	Knob, Pitch Control
29		SFUM212-02	Plate, Operation
30		SFYB5-32	Ball, Slider Ass'y
31		SFQA130-11	Spring, Slider Ass'y
32		SFUP212-20E	Slider Ass'y
33		SFUP212-03E	Slider Ass'y
34		SFUP212-06	Case, Operation
34-1		XTN3+20B	Screw, Slider Ass'y
35		SFUP212-04	Lever, Cueing
35-1		SFXW190-22	Washer, Cueing Lever

Ref. No.		Part No.	Part Name & Description
35-2		**XUC5FT**	Circlip, Cueing Lever
36		SFUK230-02E	Plate,Cueing Lever
36-1		XTV3+10C	Screw, Cueing Lever Plate
37		SFUP222-01	Lever, Start
38		SFQP230-01	Supporter, Start Lever
38-1		**XUC3FT**	Circlip, Start Lever
38-2		XTN3+5B	Screw, Start Lever
39		SFUM320-01	Cover, Neon
39-1		XTN3+10B	Screw, Neon Cover
40		SFMZ320-01Z	Stater Frame Ass'y
40-1		XTN3+10B	Screw
41-1		XTN3+8B	Screw, Heat Sink
41-2		XTV3+10C	Screw, P.C.B.
43		SFUC222-11E	Actuating Plate Ass'y
43-1		**XUC3FT**	Circlip, Actuating Plate Ass'y
44		SFUB222-11A	Operating Plate Ass'y
44-1		**XUC5FT**	Circlip, Operating Plate Ass'y
44-2		SFXW623-02	Washer, Operating Plate Ass'y
44-3		SFXW130-13	Washer, Operating Plate Ass'y
45		SFUM222-15	Plate, Switch
46		SFUM222-14	Cover, Switch
46-1		XTN3+8B	Screw, Switch Cover
47		SFUM222-13	Plate, Stop
48		SFQS222-12	Spring, Stop Plate
49		SFUK320-11E	Automatic Mechanism Ass'y
50		SFQS222-11	Spring, Supporter
51		SFUM222-11	Supporter, Gear Setting
52		SFUG190-22E	Main Gear Ass'y
52-1		SFXW890B01	Washer, Main Gear Ass'y
52-2		**XUC5FT**	Circlip, Main Gear Ass'y
53		SFUM222-16	Lever, Switch
53-1		**XUC3FT**	Circlip, Switch Lever
TONE ARM			
60		SFPWG21001K	Balance Weight Ass'y
61		SFPAM31001K	Tone Arm Ass'y
62		SFPCC31002K	Head Shell
63 [except XGF]		EPC270C2K-X	Cartridge
64 [except XGF]		EPS270ED	Stylus
64-1 [except XGF]		SFPEV9801	Screw, Cartridge
64-2 [except XGF]		SFPEN3302	Nut, Cartridge
64-3 [except XGF]		SFPEW9601	Washer, Cartridge
ARM BASE			
70		SFPJK19004	Knob, Anti-skate Force Control
71		SFPRT13004K	Lift Ass'y
71-1		SFXG829-1	Screw, Tone Arm Lift Adjustment
71-2		SFQA829-03	Spring, Lift Ass'y
72		SFKU212-01E	Arm Rest
72-1		XWG3	Washer, Arm Rest
72-2		XTN3+14BFZ	Screw, Arm Rest
73		SFUP320-05A	Tone Arm Fixing Plate Ass'y
73-1		SFPEV13204	Screw, Tone Arm Fixing Plate Ass'y
74		SFUP320-03A	Bracket, Lift Ass'y
74-1		XTN4+12B	Screw, Lift Ass'y Bracket
74-2		XTN3+10B	Screw, Lift Ass'y Bracket
75		SFUP212-02	Plate, Anti-skate Force Control
75-1		SFQP212-02	Washer, Plate
75-2		SFXG212-04	Screw, Plate
75-3		SFPSP19004	Spring, Anti-skate Force Control
76		SFUM212-01	Cam, Cueing

■ EXPLODED



■ EXPLODED VIEWS



■ REGLAGES

Mise au point de la hauteur de l'élévateur du bras. (Voir Figs. 11.)

- La hauteur du bras élévateur (distance entre l'extrémité de la pointe de lecture et la surface du disque lorsque la manette de pose et de relevage est sur "▼") a été mise au point en usine avant d'être expédiée, sur une hauteur approximative de 5 à 10 mm.
- Lorsqu'on utilise une des diverses cellules pick-up disponibles sur le marché ou lorsqu'une mise au point ultérieure est particulièrement nécessaire, faire le réglage de la façon suivante:

1. Régler la manette sélectrice de vitesse sur la position "•", pour empêcher la rotation du plateau de lecture.
2. Placer le dispositif protecteur de la pointe de lecture, s'il y en a un, pour protéger la tête de la pointe d'une éventuelle détérioration.
3. Tourner la vis de réglage dans le sens des aiguilles d'une montre ou dans le sens inverse, tout en abaissant lélévateur du bras. **(Voir Fig. 11.)**

Rotation dans le sens des aiguilles d'une montre.
— La distance entre la surface du disque et l'extrémité de la pointe de lecture diminue.
Rotation dans le sens contraire des aiguilles d'une montre.
— La distance entre la surface du disque et l'extrémité de la pointe de lecture augmente

Nota:

- Comme la vis de réglage possède une tête hexagonale, s'assurer d'effectuer la mise au point tout en abaissant l'élévateur du bras, sinon la vis ne bougera pas librement. Vérifier aussi que la tête hexagonale se retire correctement dans l'élévateur du bras quand ce dernier est libéré.

Réglage de la vitesse (avec les boutons de réglage de vitesse).

Les points du strobscope se trouvent disposés sur le bord du plateau du tourne-disque en fonction de la fréquence de reseau et de la vitesse des disques. Effectuer le mise au point, en se référant aux indications des points stroboscopiques.

1. Disposer la manette sélectrice de vitesse sur la vitesse devant être mise au point.
2. Libérer le dispositif de fixation du bras et déplacer le bras de lecture vers le disque. La lampe-témoin/éclairage du stroboscope s'allumera et le plateau commencera à tourner.
3. Il faut tourner les boutons de réglage de vitesse suffisamment, soit dans le sens "+ " soit dans le sens "—", pour que les points du stroboscope du plateau de lecture paraissent stationnaires.
   L'état dans lequel les points du stroboscope paraissent immobiles représente le nombre correct de révolutions.

Sens "+"
La vitesse du plateau augmentera. Tourner le bouton dans cette direction si les points stroboscopiques semblent "reculer", c'-à-d. se déplacer dans le sens inverse des aiguilles d'une montre. Lorsque les points paraissent immobiles, la vitesse du plateau est exacte.
Sens "—"
Ce sens diminue la vitesse de rotation du plateau.
Tourner le bouton dans cette direction si les points stroboscopiques semblent "s'écouler vers l'avant", c'-à-d. se déplacer dans le sens des aiguilles d'une montre jusqu'à ce qu'ils paraissent stationnaires.

Nota:
Image des points stroboscopiques

- La lampe témoin/éclairage du stroboscope de cet appareil utilise une alimentation disponible commercialement.
  S'il se produit une vibration de la fréquence du courant d'alimentation de l'appareil, il se peut que l'on observe un léger déplacement des points du stroboscope.
  Bien que le courant du secteur soit en général très stable en ce qui concerne la fréquence, si l'on procède à des mesures précises sur une durée suffisamment longue, il est possible d'observer une variation qui, en moyenne, est de l'ordre de 0,2%. Ce sont ces variations qui provoquent le déplacement des points du stroboscope.
  Mais l'appareil n'est pas affecté par ces variations, étant donné qu'un moteur à courant continu est utilisé. En d'autres mots, la rotation du plateau restera constante, et les légères variations dans le mouvement des points ne reflètent simplement qu'une déviation normale dans la fréquence de la source d'énergie.

Mise au point pour une position de retour automatique. (Voir Fig. 12.)

(Retirer le tapis du plateau de lecture.)
Dans le cas où le bras de lecture tend à revenir avant que l'audition ne soit terminée.
—Tourner dans le sens des aiguilles d'une montre.
Dans le cas où le bras de lecture ne peut revenir en arrière après le dernier sillon du disque.
—Tourner dans le sens contraire des aiguilles d'une montre.

■ REPLACEMENT PARTS LIST

Notes:
SL-3200(X) → [X]
SL-3200 (XAL) → [XAL]
SL-3200 (XGE) → [XGE]
SL-3200 (E) → [E]
SL3200 (XG) → [XG]
SL-3200 (XGF) → [XGF]
SL-3210 (E) → [10E]
SL-3210 (XG) → [10XG]

Ref. No.		Part No.	Part Name & Description
ACCESSORIES			
A1		SFNU320X01	Instruction Book
A2		SFWE212-01	Adaptor, 45 r.p.m.
A3 [XGF]		SFPEN3302	Nut, Cartridge
A3-1 [XGF]		SFPEW9601	Washer, Head Shell
A3-2 [XGF]		SFCZV8801	Screw, Cartridge
A3-3 [XGF]		SFPEV9801	Screw, Cartridge
A3-4 [XGF]		SFYF05A06	Polyethylene Bag
A4 [XGF]		SFKO135M01E	Overhang Gauge
A5		SFPZB3501	Shell Weight
PACKING PARTS			
P1 [X, XAL, XGE, E, XG]		SFHP320X01	Carton
P1 [XGF]		SFHP320J01	Carton
P1 [10E, 10XG]		SFHP321S01	Carton
P2		SFHH320-01	Pad, Front
P3		SFHH320-02	Pad, Rear
P4		SFHD212-01	Pad, Top
P5		SFHD212-02	Pad, Turntable
P6		SFHH212-03	Parts Box
P7		SFHD212-03	Pad, Top, Parts Box
P8		SFYC22A30	Polyethylene Cover, Parts Box
P9		SFYF60A60	Polyethylene Bag, Player Unit
P9-1		SFYH60X60	Polyethylene Bag, Dust Cover
P9-2		SFYH40X45	Polyethylene Bag, Turntable

■ PACKINGS